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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/685,213	10/14/2003	Jiang-Jen Lin	CFP 9209	4098

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EXAMINER
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RONESI, VICKEY M

ART UNIT	PAPER NUMBER
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1714

DATE MAILED: 10/17/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>		<b>Applicant(s)</b>	
	10/685,213		LIN ET AL.	
	<b>Examiner</b>		<b>Art Unit</b>	
	Vickey Ronesi		1714	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-27 is/are pending in the application.
- 4a) Of the above claim(s) 1-20 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 21-27 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☒ Claim(s) 1-27 are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
     Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)             | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date: ____.  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date ____.   | 6) <input type="checkbox"/> Other: ____.                                    |

## **DETAILED ACTION**

### ***Election/Restrictions***

1. This application contains claims directed to the following patentably distinct species of the claimed invention: AMO (claims 1-20) and AEO (claims 21-27).
2. Should applicant traverse on the ground that the species are not patentably distinct, applicant should submit evidence or identify such evidence now of record showing the species to be obvious variants or clearly admit on the record that this is the case. In either instance, if the examiner finds one of the inventions unpatentable over the prior art, the evidence or admission may be used in a rejection under 35 U.S.C. 103(a) of the other invention.
3. Applicant is advised that a reply to this requirement must include an identification of the species that is elected consonant with this requirement, and a listing of all claims readable thereon, including any claims subsequently added. An argument that a claim is allowable or that all claims are generic is considered nonresponsive unless accompanied by an election.
4. During a telephone conversation with David Pai on 9/26/2005, a provisional election was made *without* traverse to prosecute the species of AEO (claims 21-27). Affirmation of this election must be made by applicant in replying to this Office action.
5. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

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***Preliminary Remarks***

6. Applicant has use<sup>d</sup> the language “nanosilica plates” throughout the specification and claims. Silica is a compound consisting of silica and oxygen and is not equivalent with silicates or silicate clay. It is noted that while case law holds that where applicant acts as his or her own lexicographer to specifically define a term of a claim contrary to its ordinary meaning, the written description must clearly redefine the claim term and set forth the uncommon definition so as to put one reasonably skilled in the art on notice that the applicant intended to so redefine that claim term. *Process Control Corp. v. HydReclaim Corp.*, 190 F.3d 1350, 1357, 52 USPQ2d 1029, 1033 (Fed. Cir. 1999). Applicant has clearly defined that the nanosilica plates are exfoliated nanosilicate clay plates. It is suggested that applicant reconsider the use of the term nanosilica plates to represent silicate clay plates given the ordinary meaning of “silica” and replace “nanosilica plates” with “nanosilicate plates”.

***Specification***

7. The disclosure is objected to because of the following informalities:

- On page 9, 4<sup>th</sup> line from the bottom, the phrase “The poly(propylene glycol)-block-poly(oxyethylene glycol)-diamines.” is an incomplete sentence.

- On page 11, 2<sup>nd</sup> full paragraph, the phrase “a polymeric exfoliating agent, amine terminating Mannich oligomer (AMO)” seems to be out of place. As a suggestion, please delete.

Appropriate correction is required.

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8. The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required:

For claim 23, there is no support in the specification for the temperature range of 25 to 150°C.

For claim 23, there is no support in the specification for “poly(oxyethylene-oxypropylene)diamine” or polyoxybutylene diamine”. At the bottom of page 10 in the present specification, support is had only for polyoxypropylene diamine, polyoxymethylene diamine, and poly(oxyethylene-oxypropylene) diamine.

For claim 22, there is no support for the molecular weight of 4,000 g/mol. In the second full paragraph of page 11 of the present specification, molecular weights of 200-8,000 and 400-2,000 are provided. Note that on page 9, support is had for an *average* molecular weight of 4,000, but that is only for polyoxypropylene diamines.

For claim 24, there is no support for an exfoliating agent having a molecular weight ranging from 2,000 to 20,000. Note page 11, 1<sup>st</sup> paragraph of the specification where more than 25 wt % of the total *AMO* (not *AEO*) copolymers have molecular weights of 5,000-10,000 g/mol. No support is had in the specification for the molecular weight of *AEO*. Also note that Example 3 does not recite a molecular weight for *AEO*.

For claim 26, there is no support for the molar ratio of amino groups in the exfoliating agent to cationic exchange capacity of said the silicate clay ranging from 3:1 to 1:1 in step (c). Note page 7, 1<sup>st</sup> paragraph where it is stated that the “cationic exchange equivalent ratio of the

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exfoliating agent to the silicate clay is preferably 1:1 or larger with respect to acid equivalent to silicate cationic exchange capacity”.

To overcome these objections, it is suggested that the claim language be added to the specification. There is no new matter.

Appropriate correction is required.

### *Claim Objections*

9. Claim 21 is objected to for the following reasons:

- the phrases “where  $m = 1$  to 5” and “wherein  $m$  is from 1 to 5” are duplicates of each other. Please delete one of the phrases.

- At the end of part (c), insert the word “and” since it is the second-to-last method step.

- To clearly suggest a copolymer, replace “polyoxymethylene/oxypropylene” with “poly(oxymethylene/oxypropylene)”.

- In part (b), it is not clear that the acid is added to the AEO. It suggested that part (b) read as “adding inorganic acid including hydrochloric acid to the AEO to form an acidified AEO”.

Appropriate correction is required.

10. Note that in claim 27 mica is defined to be a silicate clay, however, while mica is a layered silicate, it is not a clay. Nevertheless, case law holds that where applicant acts as his or her own lexicographer to specifically define a term of a claim contrary to its ordinary meaning, the written description must clearly redefine the claim term and set forth the uncommon

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definition so as to put one reasonably skilled in the art on notice that the applicant intended to so redefine that claim term. *Process Control Corp. v. HydReclaim Corp.*, 190 F.3d 1350, 1357, 52 USPQ2d 1029, 1033 (Fed. Cir. 1999). The specification has clearly defined that mica is clay in the second paragraph on page 7. No objection is made.

### *Claim Rejections - 35 USC § 112*

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

11. Claims 21-27 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

With respect to claims 21, 22, and 23, the term “polyoxyalkylene amine” renders the claims indefinite since the subsequent AEO formula necessarily contains a polyoxyalkylene *diamine*.

With respect to claim 21, the terms “said acidified AEO” and “said exfoliated silicate clay” lack antecedent basis. It is suggested that the phrases “to form an acidified AEO” be inserted at the end of part (b) and “to form an exfoliated silicate” be inserted at the end of part (c) to correct for the indefiniteness.

With respect to claim 21, the organic group “polyethylene amino” is inconsistent since it is not a polyoxyalkylene group.

With respect to claim 21, in part (d), the term “the mixture” lacks antecedent basis. The step of mixing the ingredients is missing thus also rendering the use of the phrase “keeping the

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mixture static” indefinite. It is suggested that the part (d) be written as “mixing an aqueous solution containing hydroxide or a chloride of alkali metal or alkaline-earth metal, ethanol, water and an organic solvent to said exfoliated silicate clay obtained in step (c) to form a mixture and then, after mixing, keeping the mixture static to form an upper organic phase and a lower water phase containing nanosilica plates”.

With respect to claim 23, it is unclear what chemical compound is encompassed by the structure “poly(oxyethylene-oxypropylene)diamine polyetheramines”. Support is not had for it in the specification. It is suggested that it be replaced with “poly(oxyethylene-oxypropylene) diamine.

With respect to claim 23, the “polyoxybutylene diamine” is outside the scope of claim 21 which limits the polyoxyalkylene groups to polyoxypropylene groups and poly(oxymethylene/oxypropylene) groups. It is suggested that “polyoxybutylene diamine” be added to claim 21.

### *Allowable Subject Matter*

12. Claims 21-27 would be allowable if rewritten or amended to overcome the claim objections and the rejections under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action. A phone call made to applicant’s representative, David Pai, on October 7, 2005 regarding a possible examiner’s amendment to correct for the claim objections and 35 USC 112(2) rejections did not result in an authorization.

Note that this indication of allowable subject matter is contingent on applicant canceling withdrawn claims 1-20, there being no generic claim.



*Statement of Reasons for Allowance*

13. The present claims are allowable over the closest prior art—Lin et al (US 2004/0069188), Lin et al (US 2004/0071622), Kaylo (US 6,107,387), Iwasaki et al (JP 07-187657), Lin et al (US 6,765,050), and Lin et al (US 6,822,019)—for the following reasons.

The present claims are drawn to a method of producing separated silica plates that are isolated from the exfoliating agent comprising the steps of acidifying the exfoliating agent before mixing with a swelled inorganic layered silicate to exfoliate directly through cationic exchange, and then adding an aqueous solution containing a hydroxide or a chloride of alkali metal or alkaline-earth metal, ethanol, water, and an organic solvent before letting the mixture phase separate to obtain a random form of silica plates, wherein the exfoliating agent is an amine-terminated epoxy oligomer from polyoxyalkylene diamine and diglycidyl ether of Bisphenol A.

Lin et al (US 2004/0069188) discloses a method of producing nanosilica plates comprising the steps of acidifying the intercalating agent, mixing with a swelled inorganic layered silicate, and then adding a hydroxide or a chloride of alkali metal or alkaline-earth metal before letting the mixture settle (i.e., phase separate) to obtain isolated nanosilica plates in water, wherein the intercalating agent is an amine-terminated Mannich oligomer from polyoxyalkylene amine, p-cresol, and formaldehyde. While Lin et al discloses the method of the presently claimed invention, Lin et al fails to disclose or suggest the use of the presently claimed amine-terminated epoxy oligomer from polyoxyalkylene diamine and diglycidyl ether of bisphenol A.

Lin et al (US 2004/0069188) (US 2004/0071622) discloses a method of producing nanosilica plates comprising the steps of acidifying an amphibious intercalating agent, mixing with a swelled inorganic layered silicate, and then adding a hydroxide or a chloride of alkali

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metal or alkaline-earth metal before letting the mixture settle (i.e., phase separate) to obtain isolated nanosilica plates in water, wherein the amphibious intercalating agent is formed by copolymerizing polyoxyalkylene amine and polypropylene-grafting-maleic anhydride. While Lin et al discloses the method of the presently claimed invention, Lin et al fails to disclose or suggest the use of the presently claimed amine-terminated epoxy oligomer from polyoxyalkylene diamine and diglycidyl ether of bisphenol A.

Kaylo (US 6,107,387) discloses an acidified aqueous dispersion of exfoliated silicate with a cationic group-containing polymer such as polyglycidyl ethers of Bisphenol A, however, fails to disclose the use of an amine-terminated epoxy oligomer from polyoxyalkylene diamine and diglycidyl ether of Bisphenol A or a method step of separating the exfoliated silicate from the cationic-group containing polymer.

Iwasaki et al (JP 07-187657) discloses a clay composite wherein a swellable laminar silicate is intercalated with quaternary ammonium ions having polyoxymethylene and quaternary ammonium ions having polyoxypropylene groups. While Iwasaki et al discloses polyoxyalkylenes as intercalating agents, it fails to disclose or suggest the use of an amine-terminated epoxy oligomer from polyoxyalkylene diamine and diglycidyl ether of Bisphenol A or a method step of separating the intercalated silicate from the polyoxyalkylene groups.

Lin et al (US 6,765,050) and Lin et al (US 6,822,019) both disclose the use of a polyoxyalkylene amine as an exfoliating agent in silicates, however, each one fails to disclose the use of an amine-terminated epoxy oligomer from polyoxyalkylene diamine and diglycidyl ether of Bisphenol A or a method step of separating the exfoliated silicate from the exfoliating agent.

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*Contact Information*

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Vickey Ronesi whose telephone number is (571) 272-2701. The examiner can normally be reached on Monday - Friday, 8:30 a.m. - 5:00 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vasu Jagannathan can be reached on (571) 272-1119. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

10/12/2005

vr

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